**Title: Club Math**

**Brief Overview:**

Students will be actively involved in performance-based instruction and assessment as they design a club house using geometric shapes. Through the designing of this club house the students will be introduced to the structural significance of geometric shapes in all buildings and the purposes of these shapes. Students will demonstrate their ability to construct objects using various geometric shapes. They also will explain their problem-solving, decision- making process, and reasoning in oral and written forms.

**Links to Standards:**

- **Mathematics as Problem Solving**
  Students will demonstrate their ability to solve problems in mathematics including problems with open-ended answers, problems which are solved in a cooperative atmosphere, and problems which are solved with the use of technology.

- **Mathematics as Communication**
  Students will demonstrate their ability to communicate mathematically. They will read, write, and discuss mathematics with language and the signs, symbols, and terms of the discipline.

- **Mathematics as Reasoning**
  Students will demonstrate their ability to reason mathematically. They will make conjectures, gather evidence, and build arguments.

- **Mathematical Connections**
  Students will demonstrate their ability to connect mathematics topics within the discipline and with other disciplines.

- **Estimation & Computation**
  Students will demonstrate their ability to apply estimation strategies in computation, with the use of technology, in measurement, and in problem solving. They will determine reasonableness of solutions.

- **Number Sense & Operations**
  Students will demonstrate their ability to describe and apply number relationships using concrete and abstract materials. They will choose appropriate operations and describe effects of operations on numbers.

- **Geometry & Spatial Sense**
  Students will demonstrate their ability to describe and apply geometric relationships using one, two, and three dimensional objects. They will demonstrate congruency, similarity, symmetry, and reflections and apply these concepts to the solution of geometric problems.

- **Measurement**
  Students will demonstrate and apply concepts of measurement using non-standard and standard units and metric and customary units. They will estimate and verify measurements. They will apply measurement to interdisciplinary and real-world problem solving situations.

- **Patterns & Relationships**
  Students will demonstrate their ability to recognize numeric and geometric relationships and will generalize a relationship from data.

- **Fractions & Decimals**
  Students will demonstrate and apply concepts of fractions, mixed numbers, and decimals; use models to relate fractions to decimals and to find equivalent fractions; compute with whole numbers, fractions, and decimals; and apply fractions and decimals to problem situations.

**Grade/Level:**

Grades 3-5

**Duration/Length:**

This unit takes approximately 4 one hour class periods to complete.

**Prerequisite Knowledge:**

Students should have working knowledge of the following skills:

• Use of graph paper for drawing club house designs
• Use of rulers
• Use of compass
• Use of a protractor
• Use of Microsoft Draw or other drawing program
• Construction of geometric shapes
• Decision making
• Problem solving
• Use of pattern blocks
• Estimation
• Addition of money

**Objectives:**

Students will:

• explore geometry in the real-world.
• identify geometric shapes used in constructing buildings.
• identify reasons for using certain geometric shapes in specific places.
• provide justification for the use of these shapes.
• design a club house on graph paper.
• transfer graph paper design to Microsoft Draw or other drawing program.
• work cooperatively in groups to select a club house design.
• orally present your final club house design to the class.
• create a design using pattern blocks.
• recognize and identify the different shapes of pattern blocks.
• locate lines of symmetry in letters.
• calculate the value of a group of pattern blocks when each block is assigned a specific value.
• write number sentences involving money.
• perform number computation using money.
• be able to use various strategies to solve problems using money.

**Materials/Resources/Printed Materials:**

- New House by Joyce Maynard
- Resource Sheets 1-4
- Homework Sheet #1
- architectural drawings
- graph paper
- ruler
- Microsoft Draw or other drawing program
- pattern blocks
- rolled paper
- paint, crayons, markers, etc.

**Development/Procedures:**

**Day 1:**

- Read New House by Joyce Maynard orally to the students.
- Lead a discussion about the importance of the structure of a building. (Be sure to point out that geometric shapes are used in the construction of buildings.)
- Revisit the illustrations in New House to identify geometric shapes used in building a house (focusing on the frame of the house).
- Explain the purpose for using a particular shape in a specific area, i.e.,. triangular trusses.
- Distribute and discuss Resource Sheet #1 "Building Geometrically".
- Divide the students into teams of 2-3 to investigate the geometric shapes found in the construction of the school to complete Resource Sheet #1.
- Share the findings of each group, pointing out similarities and differences of each shape's location and purpose.
- Distribute Homework Sheet #1 "Building Geometrically at Home".
- Explain to the children that they will be looking for geometric shapes in their homes. Remind the students to also look in attics and basements for these shapes.

**Day 2:**

- Review Homework Sheet #1. Ask the students what similarities they see in the three buildings.
- Discuss the fact that all buildings begin with plans on paper.
- Share architectural drawings, illustration and/or excerpt from New Home.
- Distribute Resource Sheet #2 "Building Your Club House Geometrically".
- Read the vignette orally.
- Distribute graph paper for students' drawings.
- Collect the students' drafts and score using the scoring tool.

**Day 3:**

- Return the students' drawings and discuss exemplary products.
- Have the students edit and revise their drawings using the scoring tool and exemplary products.
- Allow students to use Microsoft Draw or other drawing program to complete final drawings if possible.
- Divide the students into teams of 4 (to become club members at a later time).
- Assign one of the following jobs to each team member: recorder (records responses on resource sheet), reporter (reports the group's decision to the class), taskmaster (keeps order in the group), and timekeeper (watches the clock).

- Distribute Resource Sheet #3 “Team Building”.
- Share the results of each team.

**Day 4:**

- Distribute Resource Sheet #4 “Our Names Geometrically Built.” Note: Use Activity 3 as a reflective journal.
- Display the students’ banners

## Performance Assessment:

This unit provides on-going assessment through performance-based instruction. The teacher will assess the students using observation and questions during different points in the daily lessons. There is also a performance-based assessment provided on Day 2. This assessment includes a checklist for students self assessment and a scoring tool for teacher evaluation.

## Extension/Follow Up:

- Write letters to the parents informing them of our project and asking them to help with the actual construction of the club house outside of school.
- Invite an architect to share career information with the students.
- Construct a scale model of your club house.
- Observe the use of geometric shapes in other buildings, i.e.,. malls, worship centers, etc.

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# BUILDING GEOMETRICALLY

| SHAPE | LOCATION | PURPOSE | ILLUSTRATION/Label |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Name: _____ Date: _____

# BUILDING GEOMETRICALLY AT HOME

| SHAPE | LOCATION | PURPOSE | ILLUSTRATION/Label |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Name: _____ Date: _____

# BUILDING YOUR CLUB HOUSE GEOMETRICALLY

We have been experiencing problems with space for club meetings. Your teachers thought it might be nice for each club to have its own club house. Your job is to design a club house to call your own. Each club member must submit a drawing of a club house. This drawing is to be completed on graph paper. It must include a title, a realistic scale, and at least 5 different geometric shapes.

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## Club House Drawing Checklist and Scoring Tool

Directions: Place a check next to all that apply.

My drawing includes:

**1. _____ a title**

**2. _____ a realistic scale**

**3. _____ 5 different geometric shapes**

**Circle the shapes you have included:**

| | |
|---|---|
| **circle** | **triangle** |
| **rectangle** | **square** |
| **hexagon** | **pentagon** |
| **trapezoid** | **rhombus** |
| **octagon** | |

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**Points**

**1. /10 a title**

**2. /15 a realistic scale**

**3. /25 5 different geometric shapes**

**/50 Total**

**Name: _____ Date: _____**

# TEAM BUILDING

**Your team has <u>15 minutes</u> to select the club house drawing of your choice. You will discuss your personal selection with your team first. Then your team will agree on <u>ONE</u> drawing. Your team must justify your decision in writing. You will later share your selected drawing with the class.**

**<u>JOBS</u>**

Recorder- _____ Time keeper- _____

Reporter- _____ Taskmaster- _____

We decided to pick _____ drawing because _____

_____

_____

_____

_____

_____

_____

_____

DATE: _____

# Our Names Geometrically Built

## Activity 1

**Your club needs a membership roster. Your team decides to make a banner of your team's names. You will get to use pattern blocks to make your name.**

1. Estimate how many patterns blocks you will need to use for your name._____

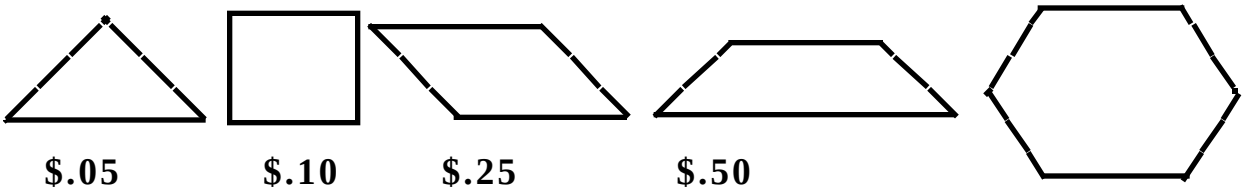
2. Create your name in pattern blocks on a sheet of white paper.

3. Trace around the block and color for display on the team banner.

4. Count how many pattern blocks you actually used. _____

## Activity 2

**If you had to buy the pattern blocks that you used in your name, what would the total cost be? Use the prices below to determine the cost of your name.**



**$.05** **$.10** **$.25** **$.50** **$1.00**

1. Write a number sentence to show how much your name costs to create in pattern blocks.

Work Space

Number Sentence _____

2. Do you have any symmetrical letters in your name? If so, what are they? Justify your answer.

_____

_____

_____

_____

Name: _____ Date: _____

**Activity 3**

**In the space below reflect on the math skills used to solve this problem.**

# Centimetre Graph Paper